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Letter to the Editor

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The role of nerve stimulation in regional anesthesia practice

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Dear Editor,

Electrical stimulation of nerves became widely used in the 1970s to more precisely locate nerves and plexuses.[1] However, developing ultrasonography (USG) devices and probes have gradually reduced the interest in nerve stimulation in regional anesthesia.[2]

In the literature, studies on the efficacy and safety of USG alone and nerve stimulation alone methods resulted in increased block success rate, decreased block procedure time, decreased risk of vascular puncture, faster block onset, and longer block duration in the USG group.[1] However, studies comparing USG alone with the addition of nerve stimulation to USG guidance have shown different results for different nerve blocks.[1] For nerve targets that can be easily visualized with USG (e.g., femoral nerve block, interscalene brachial plexus block, infraclavicular brachial plexus block, and popliteal/sciatic nerve block), nerve stimulation added to USG has no significant effect on block success and pain scores. For deep or difficult-to-visualize nerves (e.g., obturator, parasacral sciatic, subgluteal sciatic, and posterior lumbar plexus blocks), nerve stimulation may be beneficial.[1] However, these studies generally focused on block success and vascular puncture as a complication, and the nerve injury that may occur after nerve blocks was not evaluated.

The American Society of Regional Anesthesia and Pain Medicine has reported the incidence of nerve injury within 3 months after nerve blocks as 1-2.2%.[3] These rates are at a level that may cause serious concerns in clinical practice.

Even in skilled hands, the needle tip may not always be visible on USG. One study reported that the success rate of expert anesthesiologists in correctly interpreting needle positions (intraneural and extraneural) during USG-guided sciatic nerve blockade was less than 80%.[4] The simultaneous use of nerve stimulation with ultrasound serves more as a warning against needle-nerve contact that would not be recognized by ultrasound than as a means of finding nerves.[1] Animal and human studies suggest that if a muscle contraction is achieved at or below a threshold of 0.2 mA, the needle tip is likely to have contacted a nerve or is intraneural.[1] Although 0.2 mA appears to be the threshold value that most accurately distinguishes needle-nerve contact from extraneural needle position, many anesthesiologists prefer to set the current intensity higher (e.g., 0.5 mA or more) to provide earlier warning of impending needle-nerve contact.[1] In this method, if the needle under USG guidance can be placed next to the nerve, avoiding contact, and there is no muscle contraction, the stimulator is turned off and the injection is performed.[1] This method is referred to as "double guide" among anesthesiologists.[1]

The advantages of double guidance are evident in certain situations. For example, in adductor canal block, the nerve to the vastus medialis lies lateral to the saphenous nerve and may be difficult to identify on ultrasound. Double guidance allows reliable identification even when the nerve cannot be visualized.[5] Similarly, in retroclavicular block, safety can be ensured by monitoring muscle contraction while advancing the needle due to the risk of damaging the suprascapular nerve.[6] The biggest obstacle to the adoption of double guides by clinicians appears to be the increase in block procedure time.[1] However, if clinicians adopt this method and include it in routine practice, its advantages may become apparent by gradually reducing its disadvantages in terms of time.

Nowadays, nerve block needles are manufactured to be compatible with stimulation. In this context, it should be kept in mind that nerve stimulation, which can be performed with USG guidance without creating additional costs, can increase block success and reduce the risk of postoperative nerve injury.

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Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

REFERENCES

1. Gadsden JC. The role of peripheral nerve stimulation in the era of ultrasound-guided regional anaesthesia. *Anaesthesia*. 2021;76(Suppl 1): 65-73. doi:10.1111/anae.15257
2. O'Flaherty D, McCartney CJL, Ng SC. Nerve injury after peripheral nerve blockade-current understanding and guidelines. *BJA Educ*. 2018; 18(12):384-390. doi:10.1016/j.bjae.2018.09.004
3. Neal JM, Barrington MJ, Brull R, et al. The second ASRA practice advisory on neurologic complications associated with regional anesthesia and pain medicine: executive summary 2015. *Reg Anesth Pain Med*. 2015;40(5):401-430. doi:10.1097/AAP.0000000000000286
4. Krediet AC, Moayeri N, Bleys RL, Groen GJ. Intraneural or extraneural: diagnostic accuracy of ultrasound assessment for localizing low-volume injection. *Reg Anesth Pain Med*. 2014;39(5):409-413. doi:10.1097/AAP.0000000000000124
5. Dooley J, Bullock WM, Kumar AH, MacLeod DB, Gadsden J. Systematic sonographic and evoked motor identification of the nerve to vastus medialis during adductor canal block. *Reg Anesth Pain Med*. 2020; 45(11):937-938. doi:10.1136/rapm-2019-101232
6. Sancheti SF, Uppal V, Sandeski R, Kwofie MK, Szerb JJ. A cadaver study investigating structures encountered by the needle during a retroclavicular approach to infraclavicular brachial plexus block. *Reg Anesth Pain Med*. 2018;43(7):752-755. doi:10.1097/AAP.0000000000000826